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# School Effectiveness and School Improvement

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## The effect of schools on school leavers' university participation

Chris Taylor <sup>a</sup>, Caroline Wright<sup>b</sup>, Rhys Davies<sup>a</sup>, Gareth Rees<sup>a</sup>, Ceryn Evans<sup>a</sup> and Stephen Drinkwater<sup>c</sup>

<sup>a</sup>Wales Institute of Social & Economic Research, Data & Methods, School of Social Sciences, Cardiff University, Cardiff, UK; <sup>b</sup>School of Social and Community Medicine, University of Bristol, Bristol, UK;

<sup>c</sup>Business School, University of Roehampton, London, UK

### ABSTRACT

This paper considers the role that schools have in determining whether school leavers participate in higher education or not. It examines the association between schools and university participation using a unique dataset of 3 cohorts of all young people leaving maintained schools in Wales. School “effects” are identified, even after controlling for individual-level factors, such as their prior attainment, socioeconomic circumstances, ethnicity, and special educational needs. Schools appear to have a particular “effect” on the likelihood that a young person enters an elite university. However, the findings suggest the concept of a school “effect” on higher education participation is not straightforward – schools appear to have different levels of effectiveness depending on the gender of the young people and the nature of their higher education participation. These findings are considered within the policy contexts of school effectiveness and widening access to higher education.

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participation; school effects;  
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## Introduction

The underrepresentation of particular groups of society in higher education (HE) is a major concern for many governments around the world. Clancy and Goastellec (2007) describe how policies of access to HE have shifted from “inherited merit” to a “growing consensus on the need for some form of affirmative action” for selected underrepresented groups (p. 151). Numerous strategies have been developed to try and increase the participation of young people from such underrepresented groups.

Despite the proliferation of what are generally termed “widening access” activities, these are often based on a very limited understanding of who the underrepresented groups are and why they traditionally are less likely to participate in HE (Rees et al., 2015).

Across the UK, despite the massification of HE and proliferation of widening access activities in recent years, the underrepresentation of specific groups, most notably those from socio-economically disadvantaged backgrounds, remains stubbornly strong (Tight, 2012). However, the debate about underrepresented groups in HE is often hindered by the interrelationships between prior attainment – a necessary indication of an applicant’s suitability for HE – and

those groups typically underrepresented in HE. Consequently, it is not always clear whether these groups are underrepresented solely because of their prior attainment, or also due to their economic, social, and/or cultural circumstances (Gorard, 2008).

With the increasing availability of administrative and survey-based large-scale datasets, our understanding of the relative determinants of participation in HE is improving. Unsurprisingly, much of that research has tended to consider the relative impact of prior attainment, socioeconomic factors, and cultural factors on participation. Such studies have also helped understand when inequalities in access first emerge or appear to have the greatest impact during a young person's adolescence. The general consensus is that most of the variation in actual participation between particular groups can be accounted for by measures of prior attainment, particularly at age 15 (i.e., at the end of compulsory schooling) (Chowdry, Crawford, Dearden, Goodman, & Vignoles, 2013). Levels of educational achievement also appear to account for most of the variations in the *intention* to study in HE amongst different groups (Croll & Attwood, 2013; Strathdee & Engler, 2012).

There is also some consensus, however, that educational attainment alone does not account for *all* differences in participation to HE. Indeed, there will always be some suitably qualified young people who choose not to attend university. But despite some debate about the presence of any systematic variations in university access (other than those based on prior attainment) (Gorard, 2008), there is now robust evidence to show that there are small, but significant, differences in the participation rates of particular groups of school leavers. Research that attempts to account for these differences has largely examined social, cultural, and/or geographical factors. And it is these kinds of factors that widening access policies and activities tend to focus on. However, there is evidence that the school or tertiary setting a young person attends may also determine the likelihood they will go to university (Chowdry et al., 2013; Donnelly, 2015a, 2015b; Iannelli, 2004; Pustjens, Van de gaer, Van Damme, & Onghena, 2004).

This paper presents analysis using a unique dataset that allows us to track the progress of every young person leaving a maintained school in Wales between 2005 and 2007 into HE or not. Using multilevel modelling, we attempt to examine the association between attending a given school at age 15 with HE participation. To consider what role schools have in determining the likelihood of going to university, we also differentiate between participation into (a) all university courses, (b) undergraduate First Degree courses at any university, and (c) undergraduate First Degree courses in "elite" universities.

The results of this analysis suggest that after controlling for levels of prior attainment and some key socioeconomic characteristics, there are significant differences in the probability of going to university depending on which school a young person attended. It then goes on to explore the extent to which these school "effects" are related to other known school characteristics. But first, the paper provides some context to the HE policy landscape in Wales before going on to summarise previous attempts to identify the determinants of HE participation.

## Widening access policy in Wales

Since devolution in 1999, each of the four countries of the UK have sought different approaches to addressing the underrepresentation of particular groups in higher

education and how they conceptualise widening access (Donnelly & Evans 2018). Although widening access policies are devolved to their respective governments and assemblies, the nature of higher education in the UK means that these policies and their effects are not entirely isolated from one another. To illustrate this, we begin by describing widening access policy in Wales.

In 1998, significant changes were made to the cost of attending universities in Wales (and also in England). First, this was the year that tuition fees were introduced for undergraduate students. And second, maintenance grants – previously given to university students based on need – were replaced by income-contingent loans. The effect of these changes was to shift the cost of HE from the State to the individual recipient of HE to fund further expansion of the HE system. Although the impact of this shift was offset by the provision of low-interest loans, payable back over a long period of time and after students have graduated, there was considerable concern that these reforms would exacerbate the underrepresentation of particular groups of society.

Soon after the introduction of tuition fees, there was another major change to the UK higher education landscape. Following administrative devolution in 1999, there has been a transfer of powers relating to HE to each of the governments or assemblies in Wales and Northern Ireland. The nature of HE participation and the organisation of many of its activities, such as research funding, have meant that there continue to be as many similarities as there are differences in each of the four countries (Gallacher & Raffe, 2012). Nevertheless, the areas where there has been the greatest divergence have been in relation to tuition fees, financial support, and widening access strategies.

Early in the establishment of the new Assembly in Wales, the Welsh Government published *The Learning Country* (National Assembly for Wales, 2001). Although this did not set out a strategy for HE, there was a strong focus on widening access and, in particular, “extending opportunities”. It was in this paving document that a social disadvantage model was envisioned that drew a link between widening access to HE and the most socioeconomic disadvantaged areas in Wales. These areas, later to be known as Communities First areas, have since been central to the Welsh Government’s widening access policies<sup>1</sup> (see, e.g., *Reaching Higher*, Welsh Assembly Government, 2002; *For Our Future*, Welsh Assembly Government, 2009). This has also included specific targets such as the following, published by the Higher Education Funding Council for Wales (HEFCW) in their Corporate Strategies:

A 10% rise in the proportion of all Welsh domiciled students studying higher education courses at higher education institutions and further education institutions in Wales who are domiciled in the Welsh Communities First Areas from 15.6% in 2008/09 to 17.2% in 2012/13. (HEFCW, 2010, p. 10)

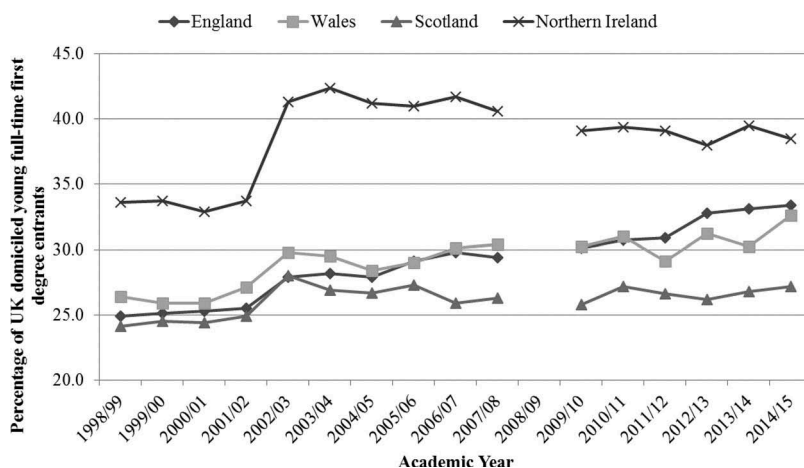
The geographical approach to widening access policy in Wales was further reinforced by HEFCW’s *Reaching Wider* initiative. In 2002, this established four *Reaching Wider* Partnerships constituted by partnerships between universities, colleges, schools, voluntary organisations, and local authorities in four different regions of Wales. Although schools and colleges are important partners in these Partnerships, the focus has largely been on supporting universities in recruiting students from Communities First areas.<sup>2</sup> Indeed, between 2006–2007 and 2013–2014 universities received a financial “reward” for every student recruited from a Communities First area.

The other key aspect of widening access policy in Wales in recent years has been in relation to student finance. Whilst the Welsh Government has not been able to shield its HE system from the introduction of tuition fees, it has attempted in a number of ways to cushion the impact of rising fees on Wales-domiciled HE students. In 2002, the Welsh Assembly Government (as it was then) reintroduced means-tested non-repayable maintenance grants, and in 2011 established the *Fee Grant*, a sizeable financial contribution towards the tuition fees for every Wales-domiciled student, irrespective of where they studied. Following the latest independent review of student finance, the Diamond Review (2016), the Welsh Government intends to replace the *Fee Grant* with increased maintenance support for students, leading to a more progressive funding system.

The apparent impact of these policies and strategies appears to have been rather mixed. In the first 10 years of devolution, it appears that universities in Wales were relatively more successful in admitting young full-time (undergraduate) First Degree students from working-class backgrounds than in England and Scotland (Figure 1). However, despite continuing to increase the proportion of students coming from working-class backgrounds universities in Wales appear to have fallen behind those of England in this area.

### The determinants of participation into higher education

As has already been noted, there is a considerable amount of research that has attempted to examine why some people, and not others, participate in HE. A great deal of this research has been necessarily qualitative – largely based on interviews with either existing undergraduate students or prospective applicants. Whilst these studies can provide useful insights into their perceptions, motivations, and attitudes, they rarely include a comparative group of non-participants, or follow a significant number of



**Figure 1.** Percentage of UK domiciled young<sup>1</sup> full-time First Degree entrants from working class backgrounds<sup>2</sup> by location of HEI provider.

Notes: Data source: HESA UK Performance Indicators 2014/15 (Widening Participation).

<sup>1</sup>Aged under 21 years.

<sup>2</sup>Social class IIM-V in 1998/99–2001/02 and NS-SEC 4–7 in 2002/03–2014/15. NS-SEC data for 2008/09 are not strictly comparable with the rest of the time series. Social class measures before 2002/03 are not strictly comparable to those after 2002/03.

potential applicants over time, in order to identify who is and who is not successful in getting in to university.

Consequently, with the increasing availability of large-scale data, either through social surveys or through administrative records, it is now possible to undertake analyses that can either provide a robust comparison of participants and non-participants, or that are able to follow large numbers of individuals over time. Although there remains some disagreement about the relative importance of each possible explanation, there is growing consensus on what constitutes the main determinants.

It is useful to distinguish here between primary effects and secondary effects for inequalities in access to HE (Boudon, 1974; Schindler & Lörz, 2012). Primary effects relate to inequalities in attainment that result from the persistent relationship between socioeconomic status (SES) and educational attainment. Secondary effects relate to the choices that young people make, given their circumstances caused by primary effects.

In terms of primary effects, prior educational attainment is by far the most important and most accepted determinant of whether someone participates in HE or not. One of the most comprehensive analyses, using data from nearly all 16-year-olds in England in 2001–2002 and 2002–2003, shows that most of the variation in participation by socioeconomic status can be accounted for by levels of educational achievement by the age of 18 years (Chowdry et al., 2013). Of course, there are well-known associations between educational achievement and socioeconomic status during compulsory and post-compulsory education. But as Chowdry et al. conclude, their findings suggest “this socio-economic difference in university participation does not emerge at the point of entry to HE” (2013, p. 454).

Other major differences in educational attainment can also be observed in differential rates of HE participation, notably by gender and ethnicity. In England and Wales, there is a significant gender gap in school-leaving qualifications that advantages females. Because of this, there are, inevitably, gender gaps in HE participation (Broecke & Hamed, 2008). Likewise, school leavers in England from ethnic minority backgrounds are, on average, more likely than White British students to go to university. Whilst some of this ethnic “gap” in HE participation can be accounted for by variations in prior educational attainment, ethnic minority school leavers are still more likely to go to university even if they have the same school-leaving qualifications (Crawford & Greaves, 2015).

Nevertheless, there remains some relationship between socioeconomic background and participation in HE. For example, Broecke and Hamed (2008) and Chowdry et al. (2013) were still able to demonstrate that the socioeconomic status of English school leavers was associated with entry to HE, albeit to a much smaller level if prior attainment had not been considered. Using longitudinal survey data, Anders (2012) draws similar conclusions, suggesting that “those in the top fifth of the income distribution are around 2.7 times as likely to attend university as those in the bottom fifth. This relationship persists, albeit smaller, even once I control for a range of other confounding factors” (p. 208).

This suggests that there are also secondary effects of socioeconomic status on HE participation, particularly relating to differences in aspirations and motivations in a young person’s early life (Schindler & Lörz, 2012) and, crucially, despite the impact of primary effects discussed above. A few longitudinal studies have focussed on university aspirations and expectations. Using data from the Longitudinal Study of Young People in England (LSYPE), Croll and Attwood (2013) demonstrated that early aspirations and expectations are an important predictor of participating after controlling for variations in levels of attainment.

They also found small but significant differences in the participation of young people by the social class of their parents. Using the same dataset, Anders and Micklewright (2015) have been able to highlight the importance of parents' education on young people's expectations, particularly if they had been to university themselves. But importantly, they showed that levels of attainment at the end of primary school education seemed to be more important in shaping expectations than having an advantaged family background.

Others have attempted to differentiate between factors in even more detail. P. Davies, Qiu, and Davies (2014), for example, have argued that cultural capital is more important in determining a young person's intentions to study at university than more social factors such as parental occupations or whether a family is in receipt of welfare benefits. Strathdee and Engler (2012) focussed on ethnic differences and revealed the complex interactions between ethnicity and other predictors. Broecke and Hamed (2008) were able to show that ethnic minority school leavers were more likely to participate in HE than White school leavers with the same school-leaving qualifications.

Croxford and Raffe (2014) found some evidence that socioeconomic disadvantaged applicants were less likely to receive an offer than their equivalently "qualified" peers, suggesting there could be important inequalities in the admissions process. Chevalier, Gibbons, Thorpe, Snell, and Hoskins (2009) have also been able to demonstrate that after controlling for levels of measured ability and socioeconomic background, young people with a more positive view of their ability tend to be more confident about going to university.

This research points to a complex set of relationships between the possible determinants of HE participation. Central to these are young people's prior levels of attainment. However, there are other contributing factors that could lead to differences in the representation of particular groups of young people in HE. These include a range of economic, social, and cultural factors. But many of the interdependencies between these and educational attainment mean that it can be difficult to differentiate the influence of one set from another, particularly over a young person's lifecourse.

Where the influence of social, economic, and cultural factors is more clearly distinct from educational attainment is in differentiating between participation into different types of universities. For example, Jerrim, Chmielewski, and Parker (2015) demonstrated that high-achieving children from disadvantaged backgrounds were less likely to enter high-status colleges or universities than their more advantaged peers in Australia, the US, and England. Gibbons and Vignoles (2012) also found that English students from low-income backgrounds were less likely to attend high-status universities than their equally qualified peers from advantaged backgrounds. They were also able to show that students from low-income households were more likely to attend universities nearer their homes, suggesting that their choices can be more limited. This corroborates previous research by Mangen, Hughes, Davies, and Slack (2010), who suggested that "[students'] postcodes affect the likelihood of attending a high-ranking university as a consequence of the uneven geographical distributions of such institutions" (p. 347).

A criticism of Boudon's (1974) primary and secondary effects is that they do not adequately take into account the role of institutions or schools on unequal outcomes. Within the school effectiveness literature, this is sometimes referred to as *tertiary* effects; another set of theoretical explanations to complement primary and secondary effects (Esser, 2016).

One of the earliest quantitative studies to examine the effects of schools on university participation was by Pustjens et al. (2004). Using multilevel logistic regression with data from



the Flemish Longitudinal Research in Secondary Education project, Pustjens et al. identified significant long-term effects on participation, although these were mediated by levels of attainment at the end of secondary education. In their analysis of all 16-year-olds in England, Chowdry et al. (2013) factored in the schools that the young people attended. Using school fixed effects, they suggested that schools in England “may have an important role to play in encouraging pupils from lower SES families to apply to high status universities” (p. 451). However, in terms of overall participation into HE they concluded, “schools mainly affect overall participation through their effect on prior achievement” (p. 451). In terms of young people’s aspirations and expectations in England, Anders and Micklewright (2015) also suggested schools could have an important role. They too used school fixed effects in their statistical modelling, but acknowledged that the association they found could reflect several school-level factors: (a) direct encouragement, (b) peer influences, or (c) unmeasured pupil or family attributes that correlate with school admissions. Attributing causation to a cluster variable is the main limitation of using large-scale quantitative data analyses.

To try and better understand this relationship, Donnelly (2015a) proposed a qualitative approach to uncovering a “school effect”. By comparing ethnographic data from purposively selected school sixth forms, Donnelly (2015b) was able to show how the “everyday practices and processes” of schools can help shape the likelihood that students would go to university and the kind of university and subject course they would choose to apply for. Using a small number of case studies, Donnelly (2015b) found that the kind of “messages” schools explicitly and implicitly transmitted to students about their post-16 choices, and the way these were “framed”<sup>3</sup>, seemed to be associated with actual levels of HE participation amongst their sixth formers.

Donnelly (2015a, 2015b) only focussed on school sixth forms. Other forms of post-compulsory education provision may also be important in determining access to HE. For example, Croxford and Raffe (2014) demonstrated that applicants from the further education (FE) college sector were more likely to enter university than equivalent applicants from school sixth forms.

The theoretical foundations for school effects are much less well developed (Scheerens, 2013), often because studies of school effectiveness tend not to study the processes of the institution. This is a limitation of this paper too. However, just as school effectiveness research began with the identification of school-level effects, the primary aim of this paper is to see if we can identify school-level effects on HE participation. By combining the analytical approaches of Chowdry et al. (2013) and Pustjens et al. (2004), this paper provides a unique insight into the relative importance of schools on university participation within Wales. It does this by: (a) using a population of school leavers in Wales – a near replication of Chowdry et al. that used a population of school leavers in England; and (b) adopting a multilevel approach to examine the odds ratios of going to university on a school-by-school basis – a similar methodological approach to that taken by Pustjens et al.

## **Data and methods**

### **Data sources**

The data used in this paper are based on four linked administrative datasets: the National Pupil Database (NPD) for Wales, including Pupil Level Annual Schools Census (PLASC) data;

individual learner records from the Lifelong Learning Wales Record (LLWR) for young people who are registered at post-compulsory educational institutions (not including school sixth forms); the Welsh Examinations Database (WED) that contains records for all young people in school sixth forms; and individual student records from the Higher Education Statistics Agency (HESA). At its core, the database follows the educational trajectories of three cohorts of young people who were in Year 11 in maintained schools (i.e., aged 15–16 years and in the final year of compulsory schooling, referred to as Key Stage 4) during 2004–2005, 2005–2006, and 2006–2007.<sup>4</sup> An illustration of the data and its cohorts is presented in Figure 2. This is only indicative since not every young person will necessarily go into the first year at university within three years of finishing Key Stage 4. Nevertheless, Figure 2 illustrates that we can identify all those leaving maintained schools between 2005 and 2008 who entered their first year at university by the age of 20 years. For the purposes of this research, we use linked data from the NPD and HESA,  $N = 110,535$ .<sup>5</sup>

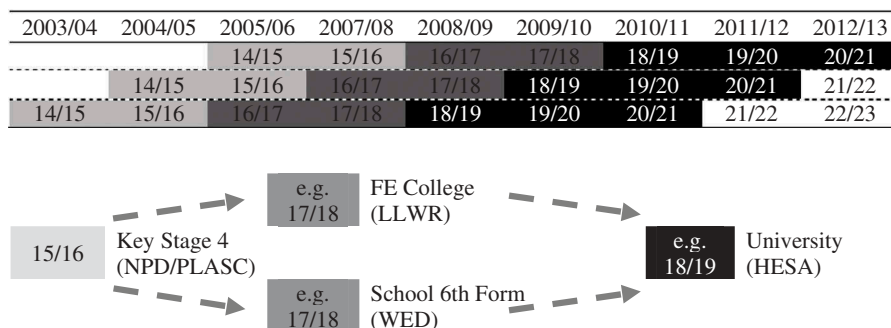
In addition to administrative data, we use the home postcode of every Year 11 pupil to link to data about the neighbourhood they lived in.

## Variables

The analysis presented in this paper looks at three possible outcomes:

- (1) HE participation: participation in any university course at any UK university;
- (2) degree participation: participation in an undergraduate First Degree course at any UK university;
- (3) elite participation: participation in an undergraduate First Degree course in an “elite” UK university.

The first of these outcomes includes any university-based course that is recorded in HESA, and includes Level 3, Level 4, Level 5, and Level 6 courses.<sup>6</sup> The second outcome is a traditional measure of university participation in Wales (and the rest of the UK) of those young people who enter university to complete an undergraduate First Degree course (typically Level 6). The third outcome differentiates all those entering an undergraduate First Degree course by the “type” of university entered. “Elite” universities are considered here to be those which constitute the Russell Group.<sup>7</sup> Each of these outcomes is “nested” within one another.



**Figure 2.** Illustration of data and age of cohorts.

To determine whether a 15-year-old eventually goes on to participate in HE, we apply an age cut-off. We record their participation if they entered HE before their 21st birthday.

To assess the influence of schools on HE participation, we consider a range of “control” variables (Table 1). These covariates include basic demographic data about the young person, such as sex and ethnicity, and are all considered to be key individual-level determinants of HE participation. Age is not included since all the young people are from the same year group. Instead, we consider season of birth – an important distinguishing characteristic of young people within a year group that has been found to be associated with educational outcomes (Crawford, Dearden, & Greaves, 2014). We also distinguish between pupils with a registered special educational need (SEN).<sup>8</sup>

For socioeconomic status, we use two variables. The first is the young person’s eligibility for free school meals (FSM) in Year 11. This helps identify those young people living in households where their parent(s) are in receipt of state benefits due to being unemployed or having low income. The number and proportion of pupils eligible for free school meals in Wales fluctuates every year but is typically between 13 to 15% of all pupils. Approximately two thirds of 15-year-old pupils eligible for free school meals were eligible for free school meals for at least the two preceding years, suggesting a high degree of stability in this measure of socioeconomic disadvantage. Unfortunately, it does

**Table 1.** Descriptive statistics of control variables used in the analysis.

Control variables		Number	Percentage
<b>NPD/PLASC (at Year 11)</b>			
Year	2005	37,371	33.8%
	2006	36,366	32.9%
	2007	36,798	33.3%
Sex	Female	54,540	49.3%
	Male	55,995	50.7%
Season of birth	Autumn	27,482	24.9%
	Winter	26,690	24.1%
	Spring	27,905	25.2%
	Summer	28,458	25.7%
Ethnicity	White British	102,819	93.0%
	White Other	1,645	1.5%
	Non-White	3,330	3.0%
	Not determined	2,741	2.5%
Free school meal status	Eligible	18,792	17.0%
	Not eligible	90,729	82.1%
	Not determined	1,014	0.9%
Special educational needs (SEN)	SEN	17,218	15.6%
	No SEN	93,317	84.4%
GCSE points score	Min 0; Max 121; <i>M</i> 41.75; <i>SD</i> 22.06		
<b>HESA data</b>			
Course of first entry	All entry	38,726	35.0%
	First degree	31,636	28.6%
University of first entry	All universities	38,726	35.0%
	“Elite” universities	7,414	19.1%
<b>Neighbourhood data derived from home postcodes in NPD/PLASC</b>			
Welsh Index of Multiple Deprivation	20% most disadvantaged	20,394	18.45%
	21–40%	20,604	18.64%
	41–60%	21,518	19.47%
	61–80%	22,645	20.49%
	20% least disadvantaged	24,298	21.98%
	Unknown	1,076	0.97%

have its limitations. For example, eligibility for free school meals is a binary measure that does not capture variations in socioeconomic status. Furthermore, there is growing recognition that there are a significant number of school-aged pupils who live in poverty but who are not eligible for free school meals (Taylor, 2018). Therefore, we also consider a second measure of socioeconomic status.

The second variable is based on the Welsh Index of Multiple Deprivation (WIMD). This is the official measure of relative disadvantage for neighbourhoods in Wales, similar to the Index of Multiple Deprivation in England. WIMD is designed to identify areas with high concentrations of several types of disadvantage, based on income, employment, health, access to services, community safety, physical environment, housing, and education. The index is regularly updated using the latest data from a wide range of administrative sources and surveys, including the UK Census. The index is calculated at the neighbourhood level, otherwise known as Lower Level Super Output Areas (LSOAs), which have a mean population size of 1,500 residents. The home postcode of each young person in Year 11 is used to identify which LSOA they live in and their corresponding WIMD score. Neighbourhoods are categorised into quintiles ranging from the 20% most disadvantaged to the 20% least disadvantaged neighbourhoods. Crucially, the 20% most disadvantaged areas are also generally known as Communities First areas. Communities First has been the Welsh Government's lead initiative in tackling poverty since 2001 and, as noted above, recruiting students from Communities First areas has been a key policy for widening access to HE in Wales. Rather than include a separate indicator for young people from Communities First areas, we use the full range of WIMD scores to show the relative importance of varying levels of neighbourhood disadvantage on university participation, *including* Communities First areas.<sup>9</sup> Again, this measure also has its limitations, privileging socioeconomic deprivation at the expense of measures of cultural capital. However, these are the only national measures for socioeconomic status available at this time. But in combination with eligibility for free school meals this can provide a relatively robust indication of variations in socioeconomic status (see also Chowdry et al., 2013).

For a measure of educational prior attainment, we develop a points score based on Year 11 pupils' Level 1 and 2 qualifications (calculated from General Certificate of Secondary Education [GCSE] and equivalent qualifications). Although university entry is typically based on A Levels or equivalent Level 3 qualifications, not every young person achieves a Level 3 qualification. Thus, to predict the probability of all school leavers going to university, we only use their school-leaving qualifications.<sup>10</sup>

The main independent variables of interest in this analysis are the state-maintained secondary schools the young people attended in Year 11 ( $N = 277$ ). The transition from secondary school and Year 11 to university is, however, not straightforward. From our analysis of 15-year-olds in maintained schools, we estimate that nearly one in five young people in Wales (18.9%) did not enter post-compulsory education before their 21st birthday (Table 2). Most young people in post-compulsory education were in Further Education (FE) colleges<sup>11</sup>, studying a variety of A Levels and vocational qualifications (44.0% of all school leavers and 54.3% of all those in some form of post-compulsory education). Of all school leavers, 26.7% went on to sixth forms (attached to secondary schools), and the remaining 10.3% of school leavers were studying a mixture of courses in FE *and* sixth forms (see R. Davies & Wright, 2014, for more details). In Wales, all 16–18-year-olds are

**Table 2.** Post-compulsory trajectories of young people in Wales.

Post-compulsory trajectory	Year 11 pupils by year			All Year 11 pupils	
	2005	2006	2007	<i>n</i>	%
Not in sixth form or FE	22.8%	17.4%	16.5%	20,910	18.9%
Sixth form only	25.6%	26.7%	27.9%	29,537	26.7%
FE only	41.3%	45.6%	45.2%	48,648	44.0%
Sixth form and FE	10.4%	10.3%	10.4%	11,440	10.3%
Total	100.0%	100.0%	100.0%	110,535	100.0%

entitled to choose from a minimum of 30 courses, 5 of which must be vocational. This means that in many parts of Wales learners could be studying across multiple settings, either in school sixth forms, FE colleges, or a mixture of both types. This complexity limits our ability to specifically examine the role of post-compulsory education in this paper. However, as we will see later, we do explore whether pupils from schools with sixth forms were more or less likely to participate in HE than those who had to move establishment.

### **Method**

To assess the possible influence of schools on HE participation, we use random-effects models, otherwise known as multilevel models. We use two-tier models to reflect children (Tier 1) nested in schools (Tier 2). Nearly all the variables entered into the models are related to the child (their background, the characteristics of the neighbourhood they live in, their educational attainment, etc.). The only variable entered at Tier 2 is the school they attended at age 15. This allows us to quantify the school “effects” so they can be compared with one another and used for further exploratory analysis, similar to other studies of school effectiveness (see Luyten & Sammons, 2010).<sup>12</sup>

As with Chowdry et al. (2013), we look at these relationships separately for males and females due to well-known differences in attainment between these two groups and to allow us to compare our results with those of Chowdry et al. But to ensure we have robust results at the school level, we use pooled data from across the three cohorts to maximise the number of cases available in the model (although we control for the year the young people completed their school-leaving qualifications). Since all three sets of outcomes are binary, we use random intercept logit models to generate odds ratios for comparing groups of young people. Finally, as we are using population data, tests of significance are not meaningful. However, we present 95% confidence intervals for the odds ratios to reflect how divergent the distributions between groups are.

### **Participation of young people from Wales into higher education**

The results of the random intercept logit models are presented in Table 3 for all the control variables.<sup>13</sup> These are derived from fully adjusted models, meaning that all the covariates reported in Table 3 have been controlled for by each of the other covariates. This shows that a one grade improvement in a young person’s GCSE results increases their probability of participating in HE by 11% on average. Although the control variables are not of primary interest in this paper, it is useful to note that after controlling for attainment at the end of compulsory schooling:

**Table 3.** Odds ratios (and confidence intervals) for control variables in two-tier multilevel models.<sup>1</sup>

Random intercept logit models	Model A: HE participation		Model B: Degree Participation		Model C: Elite participation	
	Females	Males	Females	Males	Females	Males
GCSE points score	1.11 (1.11, 1.11)	1.10 (1.11, 1.11)	1.11 (1.11, 1.11)	1.10 (1.10, 1.11)	1.11 (1.11, 1.12)	1.13 (1.12, 1.14)
Free school meals	<i>Reference group: Not eligible</i> Eligible 0.80 (0.74, 0.87)	0.90 (0.82, 0.99)	0.75 (0.68, 0.82)	0.86 (0.77, 0.94)	0.91 (0.74, 1.15)	0.85 (0.63, 1.11)
Ethnicity	<i>Reference group: White British</i> White Other 1.43 (1.12, 1.79) Non-White 1.96 (1.70, 2.27)	1.35 (1.06, 1.73) 2.32 (1.99, 2.70)	1.16 (0.92, 1.46) 1.65 (1.43, 1.91)	1.23 (0.96, 1.59) 1.98 (1.71, 2.31)	1.60 (1.14, 2.24) 1.79 (1.42, 2.21)	1.13 (0.78, 1.59) 1.74 (1.37, 2.25)
Season of birth	<i>Reference group: Autumn</i> Winter 1.10 (1.02, 1.17) Spring 1.12 (1.05, 1.19) Summer 1.23 (1.16, 1.31)	1.10 (1.02, 1.18) 1.19 (1.12, 1.28) 1.25 (1.17, 1.34)	1.08 (1.02, 1.16) 1.09 (1.03, 1.17) 1.20 (1.13, 1.29)	1.07 (1.00, 1.15) 1.16 (1.08, 1.24) 1.25 (1.17, 1.34)	1.00 (0.88, 1.12) 1.00 (0.89, 1.12) 1.07 (0.95, 1.20)	0.96 (0.86, 1.10) 1.97 (0.95, 1.23) 1.05 (0.95, 1.18)
Educational needs	<i>Reference group: No SEN</i> SEN 1.16 (1.05, 1.30)	1.37 (1.56, 1.74)	1.04 (0.93, 1.18)	1.02 (0.92, 1.12)	1.33 (1.01, 1.74)	0.97 (0.74, 1.23)
Welsh Index of Multiple Deprivation	<i>Reference group: 5<sup>th</sup> quintile (least disadvantaged)</i> 4 <sup>th</sup> quintile 0.86 (0.79, 0.93) 3 <sup>rd</sup> quintile 0.79 (0.72, 0.86) 2 <sup>nd</sup> quintile 0.66 (0.60, 0.72) 1 <sup>st</sup> quintile 0.66 (0.60, 0.72)	0.90 (0.83, 0.97) 0.85 (0.80, 0.91) 0.77 (0.71, 0.84) 0.69 (0.63, 0.75) 1.65 (1.52, 1.69)	0.89 (0.83, 0.96) 0.81 (0.75, 0.87) 0.69 (0.64, 0.76) 0.69 (0.63, 0.75) 1.50 (1.43, 1.57)	0.92 (0.84, 1.00) 0.92 (0.85, 1.00) 0.81 (0.74, 0.88) 0.67 (0.61, 0.73) 1.53 (1.45, 1.61)	0.86 (0.77, 0.97) 0.88 (0.77, 1.01) 0.88 (0.77, 1.02) 0.86 (0.74, 1.01) 1.90 (1.74, 2.06)	0.85 (0.74, 0.96) 0.94 (0.81, 1.08) 0.79 (0.66, 0.92) 0.77 (0.63, 0.93) 2.03 (1.84, 2.23)
School MOR <sup>2</sup>	44,945	42,233	44,118	39,027	16,359	12,193
DIC (Multilevel)	46,368	43,739	45,163	40,054	17,168	12,898
DIC (Single level)						

<sup>1</sup>All models use the full population of three cohorts of 15-year-olds. Females  $N = 54,540$ . Males  $N = 55,995$ .  
<sup>2</sup>The median odds ratio (MOR) translates the higher level variances into the odds ratio scale. The MOR is defined as the median value of the odds ratio between the school with the highest participation and the school with the lowest participation. The MOR allows us to estimate the increased chances of participation that would result from moving from, for example, a lower to a higher participation school, if two schools are chosen at random from the distribution with the estimated school variance.

- Young people who were eligible for free school meals were on average less likely to participate in HE than non-eligible 15-year-olds;
- young people from ethnic minority backgrounds were, on average, much more likely to participate in HE than White British young people;
- pupils with a known special educational need were more likely to participate in HE than pupils without a SEN; and
- young people from disadvantaged areas were less likely to participate compared to young people living in more advantaged areas of Wales.

Interestingly, after controlling for prior attainment, it appeared that young people born later in the academic year (i.e., summer-born) were more likely to go to university than young people born during the early part of the academic year (i.e., autumn-born). This would suggest that any differences in attainment that privileges autumn-born young people may be mitigated by the greater probability that summer-born young people with the same levels of attainment are more likely to access HE.

It is also worth noting that despite having an overall greater rate of participation in HE than young men, the effect of socioeconomic disadvantage on young women was greater. For example, young women eligible for free school meals were 20% less likely to participate in any form of HE than young women not eligible for free school meals. This is a wider “gap” than it was for equivalent young men, where there was only a 10% difference in the odds ratio. Similarly, the detrimental “effect” of living in socioeconomically disadvantaged areas on HE participation was greater amongst females than it was for males.

Another important observation to make from [Table 3](#) is that the odds ratio of participating in HE for females was almost the same irrespective of whether they lived in the first WIMD quintile (i.e., the 20% most disadvantaged neighbourhoods) or the second WIMD quintile (i.e., the 21–40% most disadvantaged neighbourhoods). This could be an indication of the “effect” of the Welsh Government’s priority for widening access from Communities First areas (i.e., the 20% most disadvantaged neighbourhoods), although it should be noted that, in the main, neighbourhood deprivation seems to be more detrimental to female participation than male participation.

Finally, [Table 3](#) shows that the relationships between young people’s background characteristics and HE participation were similar irrespective of the kind of course the young people participated in (i.e., all higher education courses versus first degree courses). In contrast, these relationships did differ in terms of which kind of universities (i.e., all universities versus elite universities) the young people attended. Generally, differences in participation between various groups of young people were smaller for entry to elite universities. This possibly reflects the greater importance of prior attainment on entry to elite universities. But it could also suggest that for young people in Wales entry to elite universities is more equal than it is for entry to other universities. The main exception to this was young men who were eligible for free school meals at age 15 – this group seems to be more disadvantaged when it comes to entry to elite universities than they were for general HE participation.

### ***School effects on higher education participation***

The deviance information criterion (DIC) is a measure of model fit that considers the complexity of the model (Spiegelhalter, Best, Carlin, & van der Linde, 2014). A smaller DIC score suggests



a better fit of model. [Table 3](#) presents the DIC for single-level models (that exclude schools) and multilevel models (that include schools). The multilevel DICs are smaller than the single-level DICs, which suggests they have far superior predictive capacity and are therefore “better” models.

The results for the 277 school-level odds ratios are illustrated in [Figure 3](#) for females and [Figure 4](#) for males. These are adjusted odds ratios after controlling for the background characteristics outlined above. If there was no difference in the likelihood that someone went to university according to the maintained secondary school they attended, then all the odds ratios would be equal to or close to 1.0 (i.e., the charts would have a horizontal distribution). For most schools, there are very few differences in these odds ratios – that is, their odds ratios are all around 1.0. However, after controlling for the background characteristics of young people ([Table 3](#)), it appears that the odds of going to university varied considerably in many other schools. There are approximately 46 schools where the odds of young people participating in HE are 35% greater than the average, and 35 schools where the odds are 35% lower. In some schools, the odds of going to university were as much as 250% higher than average. Conversely, attending other schools lowered the odds of going to university by as much as 80%.

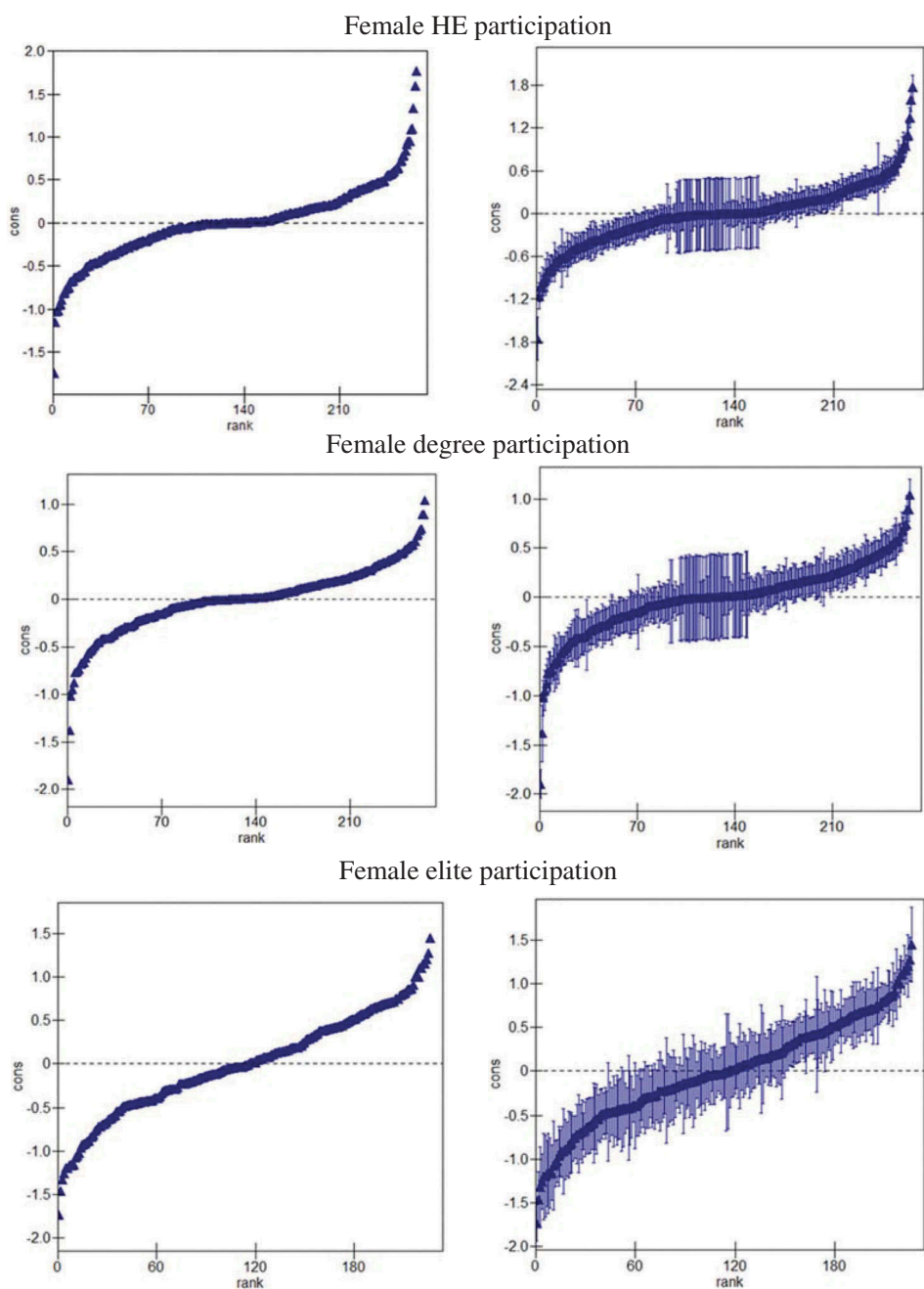
These school “effects” appear to be important for both males and females, and irrespective of the type of course or type of university a young person accessed. However, [Figures 3](#) and [4](#) suggest that school “effects” may be of even greater importance in accessing elite universities. This could be crucial when we consider the results above that suggested individual characteristics were less important in determining access to elite universities compared to all HE participation.

There is a strong correlation between schools that improve the likelihood of going to university for young women and schools that improve the likelihood of going to university for young men ([Table 4](#)). However, it is notable that there is some variation, particularly again for elite participation. This would suggest that some schools improve the likelihood of accessing elite universities for females and other schools are better at improving the likelihood of accessing elite universities for males.

Schools that improve the chances of participating in HE are generally found to improve the chances of entering on to a First Degree course or accessing an elite university ([Table 5](#)). However, there is a noticeable mismatch between the “effects” of schools in enabling entry to HE generally and their “effects” in helping young people access elite universities. For both females and males, the correlations between school-level odds ratios are relatively low ( $R = 0.31$  and  $0.39$ , respectively).

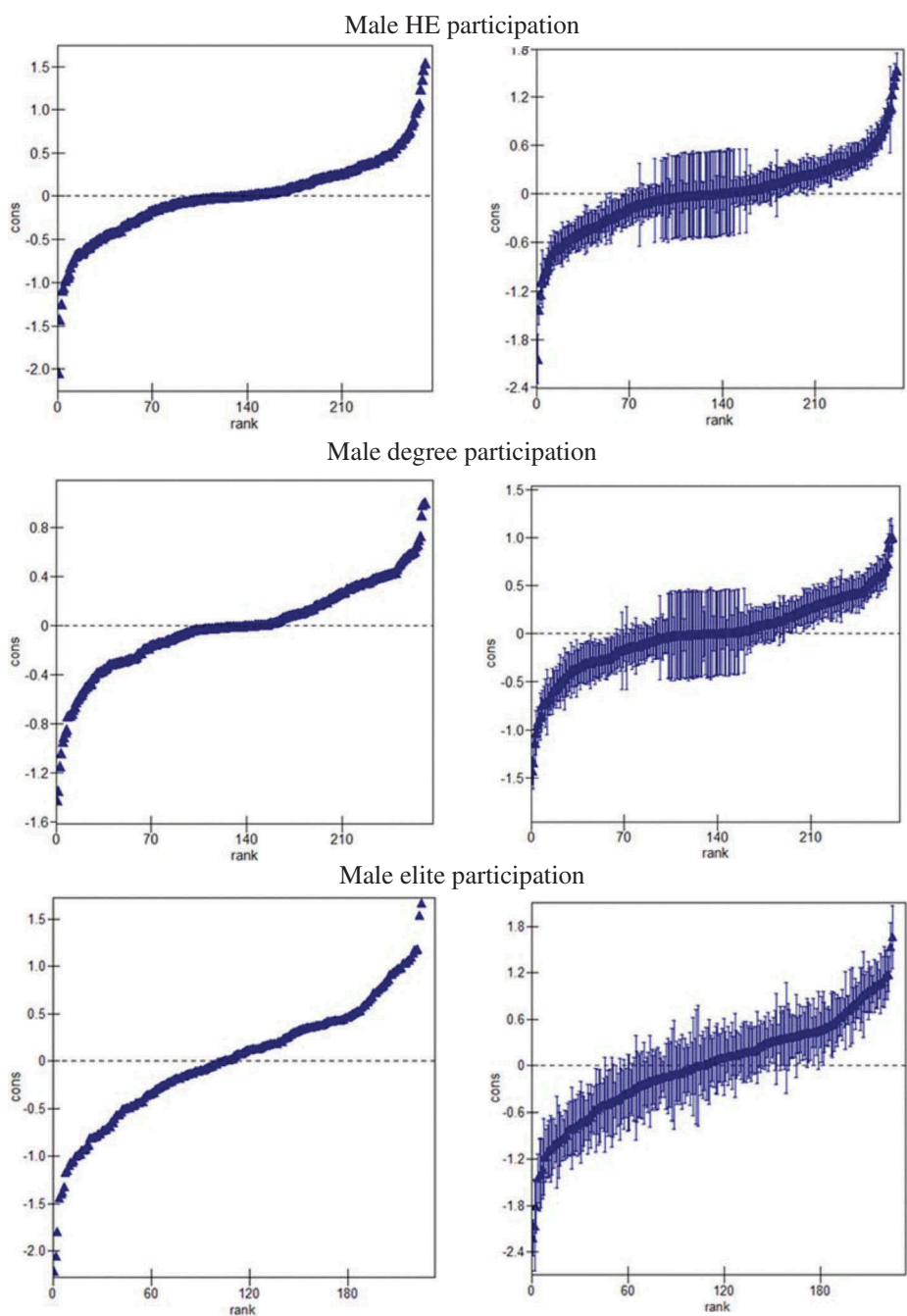
Finally, we briefly consider whether these school “effects” on HE participation are related to other known school characteristics. First, we consider if they are related to the overall effectiveness of schools. To demonstrate this, we draw upon the Welsh Government National School Categorisation System (NSCS), the main purpose of which is to identify the needs of schools based on their current quality of leadership and teaching and learning. All maintained schools are categorised into four bands – from green (requiring the least amount of support), to yellow, to amber, and finally to red (requiring the most amount of support). These categories are based on two sets of judgements – a data-driven judgement based on a range of performance measures, including contextual value-added measures, and a judgement about a school’s capacity to improve based on self-evaluation in consultation with external advisors. This system





**Figure 3.** School-level odds ratios for female participation in higher education (with and without 95% confidence intervals).

was only introduced in 2014, but a comparison with the most recent outcomes of the NSCS illustrates very clearly that a school’s effectiveness in terms of HE participation appears to be independent of their effectiveness in relation to teaching and learning. [Figure 5](#) compares the HE participation odds ratios by school category. This shows that



**Figure 4.** School-level odds ratios for male participation in higher education (with and without 95% confidence intervals).

young people from schools in the red category (i.e., currently requiring the most support according to the NSCS) had, on average, higher odds of HE participation after controlling for young peoples' levels of attainment and socioeconomic background.

**Table 4.** Correlation coefficients ( $R$ ) between school-level odds ratios for females and males.

	$R$
HE participation	0.77
Degree participation	0.75
Elite participation	0.58

**Table 5.** Correlation coefficients ( $R$ ) between school-level odds ratios by nature of HE participation.

		HE participation	Degree participation
Females	Degree participation	0.68	
	Elite participation	0.31	0.53
Males	Degree participation	0.75	
	Elite participation	0.39	0.56

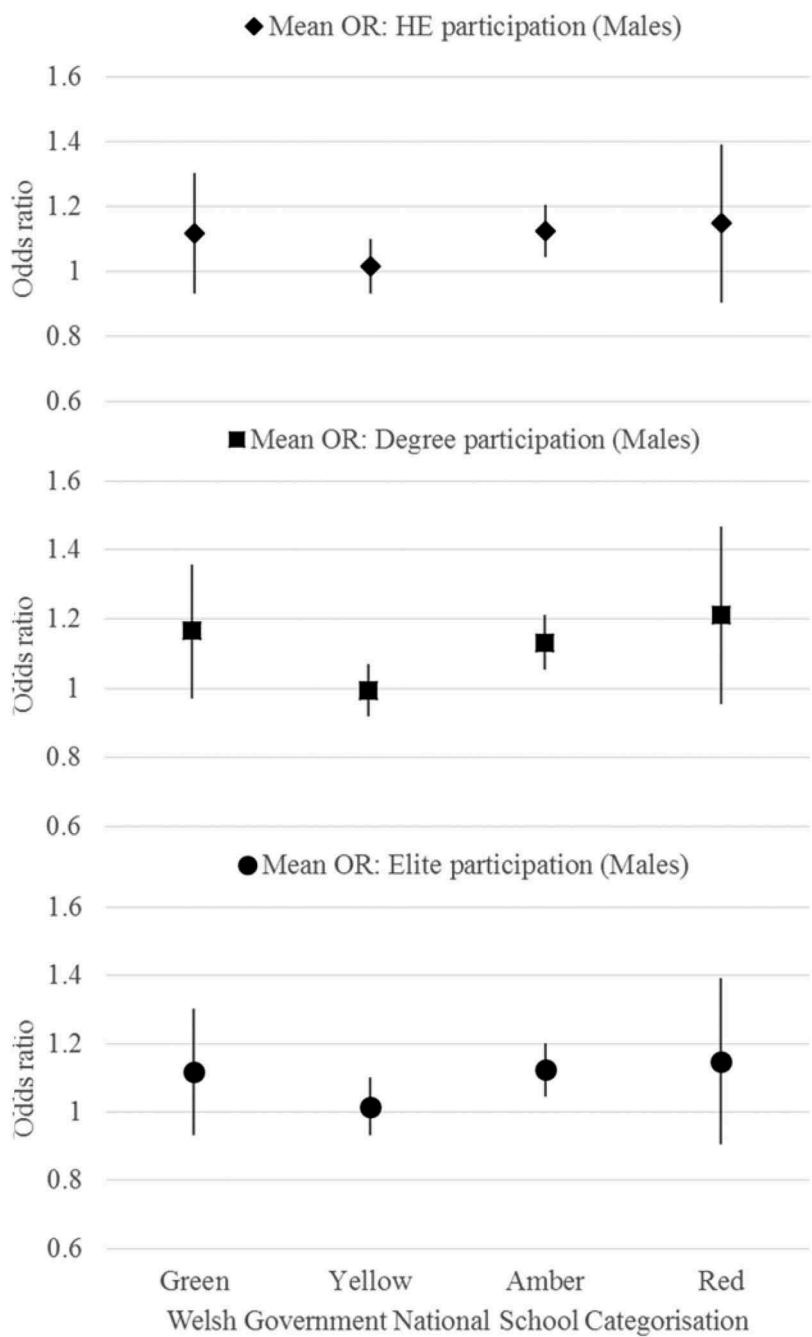
We also find that these school “effects” on HE participation do not appear to be related to other known characteristics, such as school size, medium of instruction, or whether the school has a sixth form or not (Figure 6).

## Discussion

By linking the records of all school leavers in Wales to all records of HE participation, we have been able to distinguish between young people who go on to participate in HE by the age of 21 years from those that do not. The resulting dataset has provided a unique opportunity to examine whether participation in HE is associated with several key factors, including young people’s prior attainment, gender, ethnicity, and socioeconomic status.

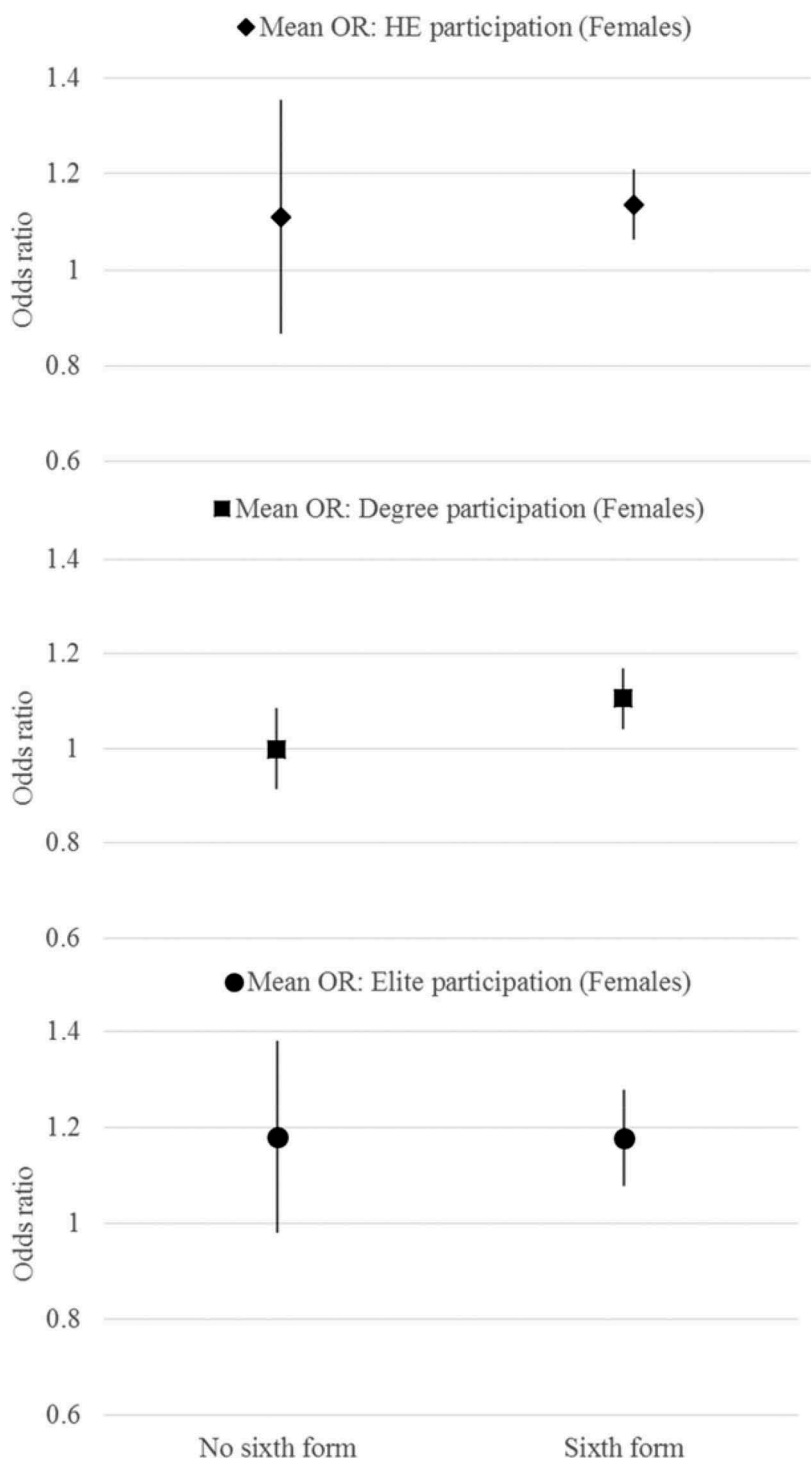
Despite the strengths of this analysis, there are still a number of limitations. First, the measures of socioeconomic status are limited in their ability to differentiate between levels of socioeconomic advantage and disadvantage. Second, we are unable to consider the impact of cultural factors on HE participation. These are both key limitations of using administrative data. A third limitation to this analysis is the absence of any reference to what happens to the young people after they have completed their school-leaving qualifications at age 15 but before they enter university (usually after the age of 18). Subject (and qualification) choices in post-compulsory education have been found to be related to the likelihood of entering HE (Sammons, Toth, & Sylva, 2015). Although this has not been the focus of this paper, the young people’s post-compulsory education experiences could play a continuing role in whether they go to university or not.

But the main aim of this paper was to see whether it was possible to identify a relationship between HE participation and the secondary schools that the young people attended. Schools are important sites of a young person’s development, both educationally and socially. Even if many decisions about going to university are made after a young person leaves school, it is our suggestion that they still can play an important role in shaping those subsequent decisions (e.g., in preparing young people for post-compulsory education and guiding subject choices). Remarkably, we have been able to show that young people who are similar in many ways (including our measures of prior attainment and socioeconomic status) have very different chances of participating in HE simply by virtue of the school that they attended. We have also shown that these school “effects” seem to be of particular importance in helping



**Figure 5.** Mean school-level odds ratios (males only) by Welsh Government National School Categorisation (with 95% confidence intervals).

to determine whether young people access elite universities or not. It is already widely known that schools have an “effect” on pupil attainment and socioeconomic gaps in attainment (e.g., Strand, 2014). But since we “control” for young people’s prior attainment, we are identifying an *additional* school “effect” on their chances of going to university.



**Figure 6.** Mean school-level odds ratios (females only) by schools with sixth forms and schools without sixth forms (with 95% confidence intervals).

As noted earlier, attributing causation to a cluster variable is problematic. As Anders and Micklewright (2015) pointed out, these school “effects” could reflect a number of school-level factors, including peer influences and family attributes that are associated with a school’s intake. Nevertheless, the use of multilevel models allows us to estimate the size of effects at the school level, from which further consideration of the causal relationships is now possible.

The work of Donnelly (2015a, 2015b) has shown how schools can differentially support young people in their HE aspirations and choices, including the way they help “frame” the kinds of messages about HE the young people receive and reproduce. The analysis presented here has also shown that the “effect” of schools is particularly strong in terms of young people’s entry to elite universities. This suggests that the kind of knowledge and support required to access elite universities is even more unevenly distributed between schools. There is a compelling case that schools play an important role in determining whether a young person will enter HE or not, and if so what form of participation that will be.

There are a number of other school-level factors that could contribute to these school “effects”. These include whether schools have a sixth form, the size of the schools, or the medium of instruction. However, further exploration of the results of the random intercept logit models revealed that the school odds ratios do not appear to be related to any of these characteristics.

This further supports the argument that the attitudes, priorities, and expertise of staff working in schools might be a more important explanation for these school “effects”. However, the results of this analysis also demonstrate how complex the concept of a school “effect” in HE participation might be. For example, young persons attending a school with a high rate of HE participation does not necessarily mean that the odds of them attending an elite university are also high, and vice versa. Furthermore, these school “effects” can differ markedly depending on whether the young person is male or female. It is also important to note that the “effects” of schools on HE participation do not appear related to other forms of school effectiveness, such as the “official” way the Welsh Government currently conceives a school’s effectiveness in raising educational attainment.

Of course, ensuring school leavers achieve their highest grades in their school-leaving qualifications is still the most important determinant of HE entry, and should, therefore, continue to be the main priority for schools. However, these results suggest that there are other ways schools help (or hinder) the progress of their school leavers into HE, and that these should be given greater attention by school leaders and policymakers. In the case of Wales, this should involve a shift in its widening access policy away from area-based strategies to more school-focussed strategies.

## Notes

1. Communities First areas have also had their own programme of activities, designed to tackle poverty in Wales.
2. It also included an important focus on looked-after children and care leavers, although the numbers of these have been considerably smaller than those from Communities First areas.
3. Using Bernstein’s (1975) theories of educational transmission.
4. This approximates 97.5% of all 15-year-olds in Wales, and excludes the 2.5% of 15-year-olds who attend an independent school.
5. Of these 110,535 students, 38,726 (35%) entered HE between 2007 and 2010 and 31,636 (29%) to do degrees.

6. In England, Wales, and Northern Ireland, there is a national qualifications framework for general and vocational qualifications. Qualifications are divided into Levels, indicating their relative size and difficulty. The higher the Level, the more difficult the qualification. General school-leaving qualifications in England, Wales, and Northern Ireland are Level 1 (e.g., GCSE grades D to G) or Level 2 (e.g., GCSE grades A\* to C).
7. The membership of Russell Group universities can be found at: <http://russellgroup.ac.uk/>
8. This includes pupils with a Statement of special educational needs and pupils who have “school action” or “school action plus” (i.e., any pupil who receives additional support due to their learning difficulties).
9. We did not use the participation of local areas (POLAR) classifications because it was felt between the individual-level SES measures (FSM) and the neighbourhood-level SES measure (WIMD) this aspect of influence had been captured.
10. Data were available for Level 3 points scores (e.g., A Levels), but only for the HE participating population. As such, these can only be used in a limited way. We explored the association between Level 2 and Level 3 qualifications and higher education participation and found Level 2 points to be a better predictor of university entry, and that Level 3 qualifications have little additional relationship once Level 2 qualifications are used.
11. There is only one maintained sixth form college in Wales, so to maintain anonymity this is included with FE colleges.
12. The main alternative approach, using fixed effects models (and as used by Chowdry et al., 2013), is useful for controlling for cluster effects (such as schools) but may result in unstable estimates unless all cluster sizes are large, and does not provide the basis for further exploration of particular schools’ effects.
13. Cohort year is also included in the model, but the odds ratios are not presented in Table 3 or discussed. This is because earlier cohorts were more likely to have entered higher education by age 21 within the timescale of the analysis, which makes interpretation of these results meaningless.

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## Notes on contributors

**Chris Taylor** is Professor of Education at Cardiff University and is the Cardiff Co-Director of the Wales Institute of Social & Economic Research, Data & Methods. Chris has published extensively on a wide range of educational issues and has undertaken research across all education sectors, from early years to higher education.

**Caroline Wright** is a Research Associate in the School of Social and Community Medicine at the University of Bristol. Caroline is currently undertaking a programme of research concerned with engagement in multiple risk behaviours (MRBs) amongst adolescents using linked data from the Avon Longitudinal Study of Parents & Children (ALSPAC).

**Rhys Davies** is a Research Fellow in the Wales Institute of Social & Economic Research, Data & Methods at Cardiff University. Rhys has undertaken a variety of research projects examining a variety of issues related to employment and the labour market. He is currently the Associate Director of the ESRC Wales Administrative Data Research Centre.

**Gareth Rees** is an Emeritus Professor in Cardiff University and was formerly the Director of the Wales Institute of Social & Economic Research, Data & Methods. Gareth has published extensively on sociological analyses of higher education and the social organisation of lifelong learning.

**Ceryn Evans** is a Research Associate in the Wales Institute of Social & Economic Research, Data & Methods at Cardiff University. Ceryn has published on how social class and geographical place bear upon young people's educational transitions. Ceryn is currently working on a research project exploring the role that graduates play in local civil society.

**Stephen Drinkwater** is Professor of Economics in the Business School at the University of Roehampton, London. He was previously a Reader in Economics at Swansea University, working closely with the Wales Institute of Social & Economic Research, Data & Methods. Stephen's main research interests lie in applied micro-economics, particularly within the labour market.

## ORCID

Chris Taylor  <http://orcid.org/0000-0002-9146-9167>

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